Nitrogen and phosphorus use efficiencies in agricultural production and their effects on water pollution in China

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Agriculture and water pollution

The Chinese Yellow Sea

Source: http://www.bundpic.com/2008/07/5424.shtml

Research objective and study area

To analyze the **nutrient use efficiencies** in agriculture and its impacts on **water pollution** in China

- > 2,500 counties
- Nine argo-ecological zones

NUFER model (**NU**trient flows in **F**ood chains, **E**nvironment and **R**esources use)

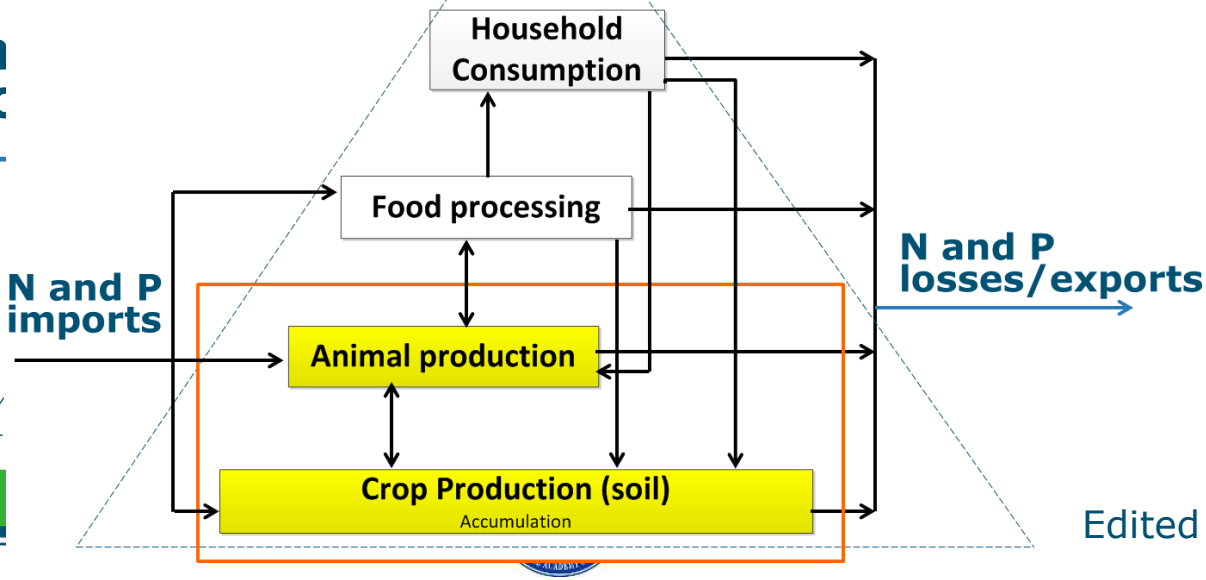
- > 2 500 Chinese

$$Nutrient\ use\ effiencies = \frac{Nutrient\ \boldsymbol{exports}\ via\ agricultural\ products}{Nutrient\ \boldsymbol{imports}\ to\ the\ agricultural\ system} * 100\%$$

efficiencies

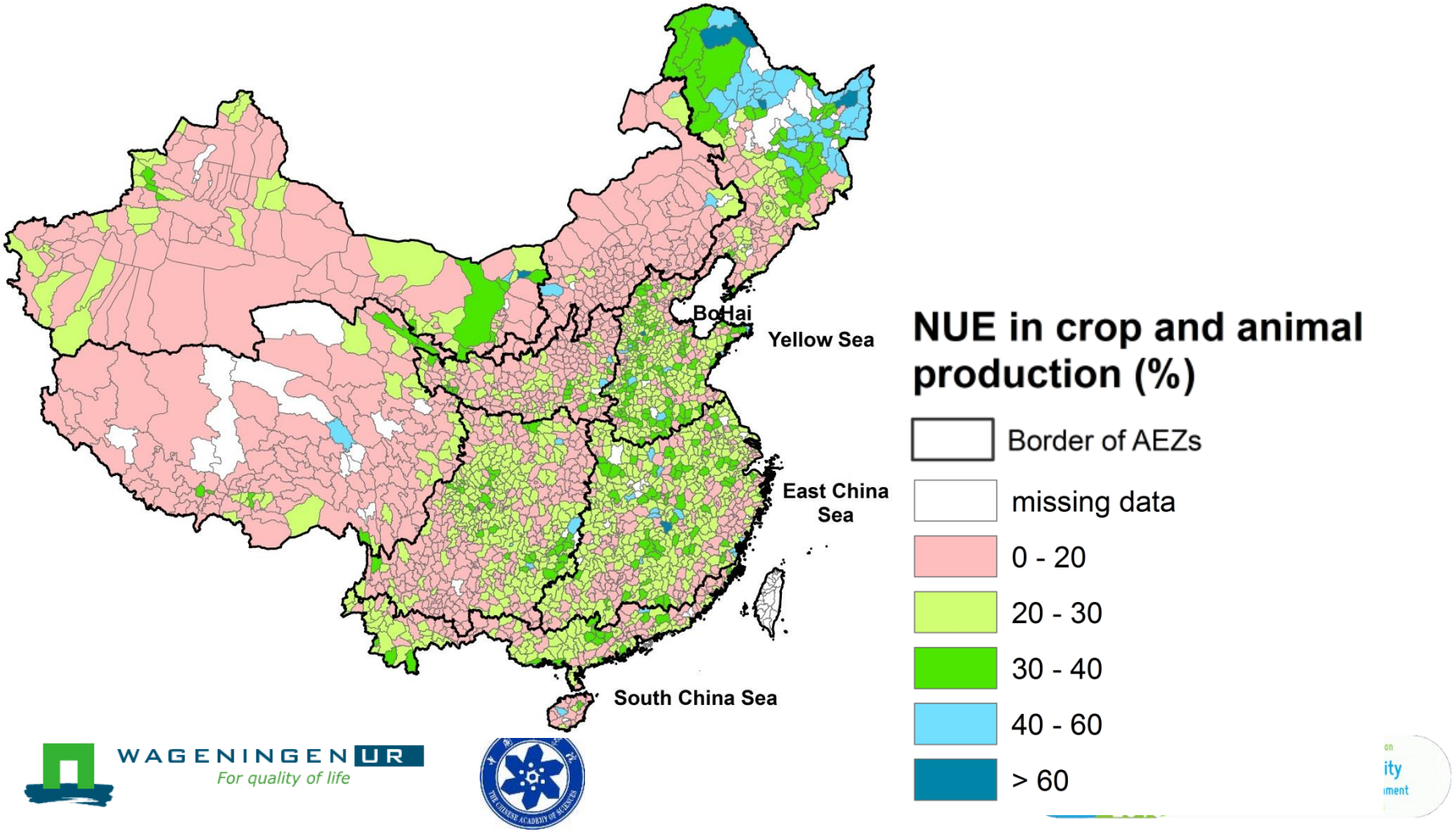
N and P losses/exports

N an impo



Edited from Ma et al., (2010)

Nitrogen Use Efficiencies (NUEs) in agriculture in 2000



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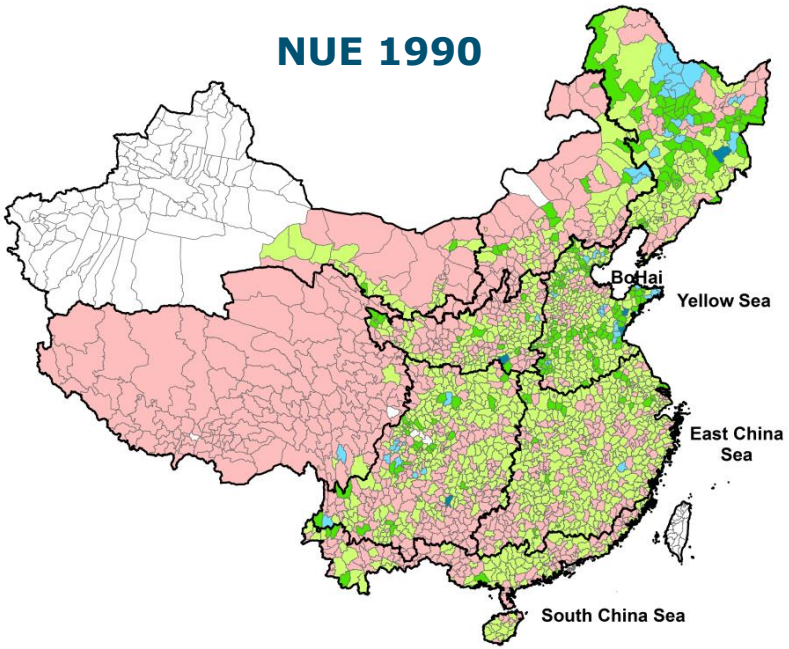
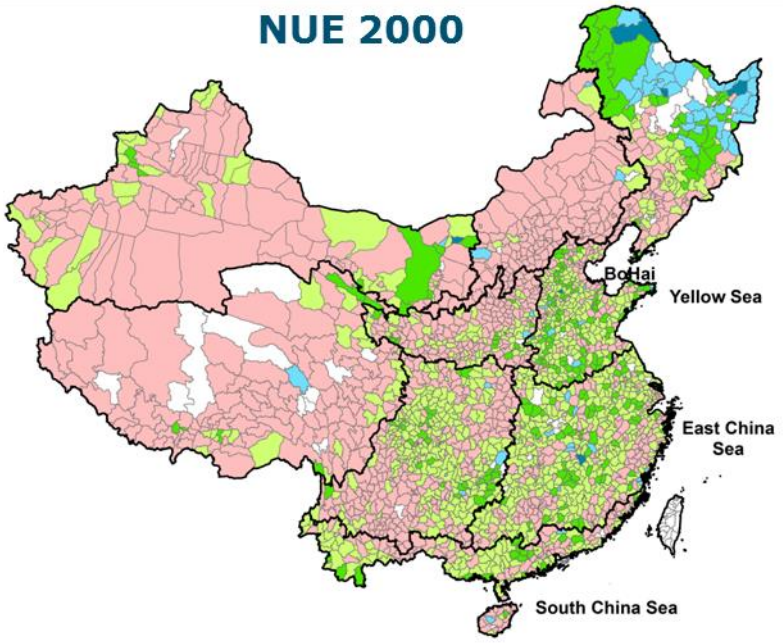
ncies (NUEs) in and 2000

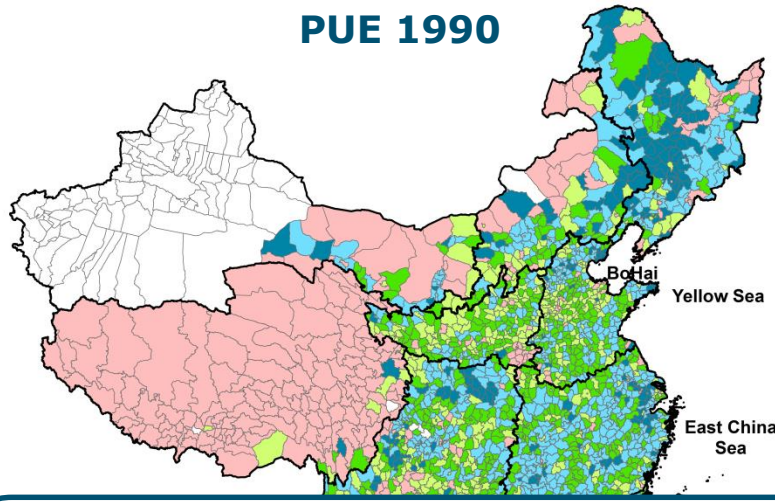




NUE in crop and animal production (%)

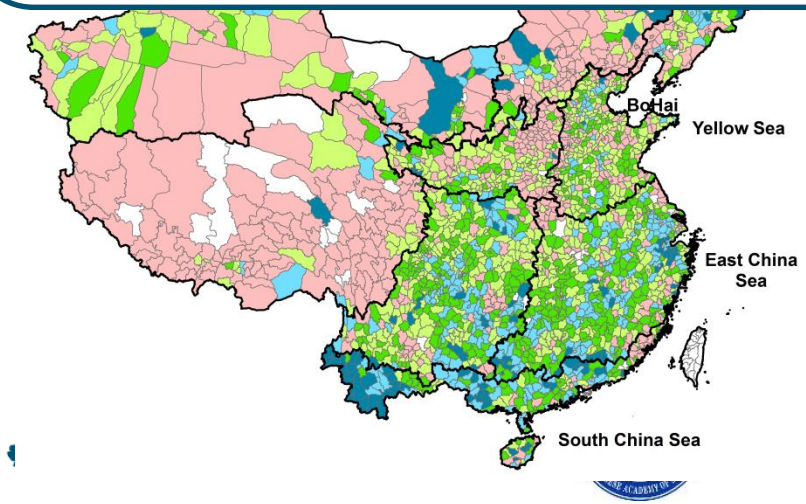
- Border of AEZs
- missing data
- 0 - 20
- 20 - 30
- 30 - 40
- 40 - 60
- > 60

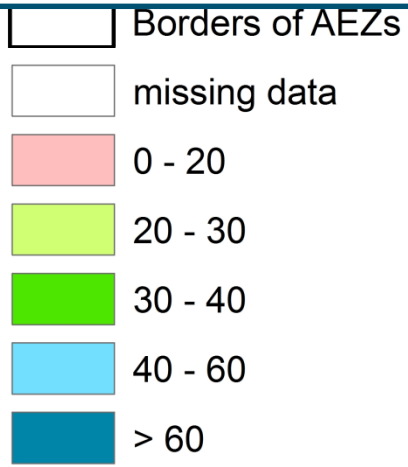
iciencies (PUEs) in and 2000



Nutrient use efficiencies:

- are generally low
- have large spatial variations
- decreased between 1990 and 2000





Scenario analysis: 2030

- Business As Usual (BAU)
- Improved Management (IM)
  - Animal Feeding
  - Fertilization
  - Manure Recycle

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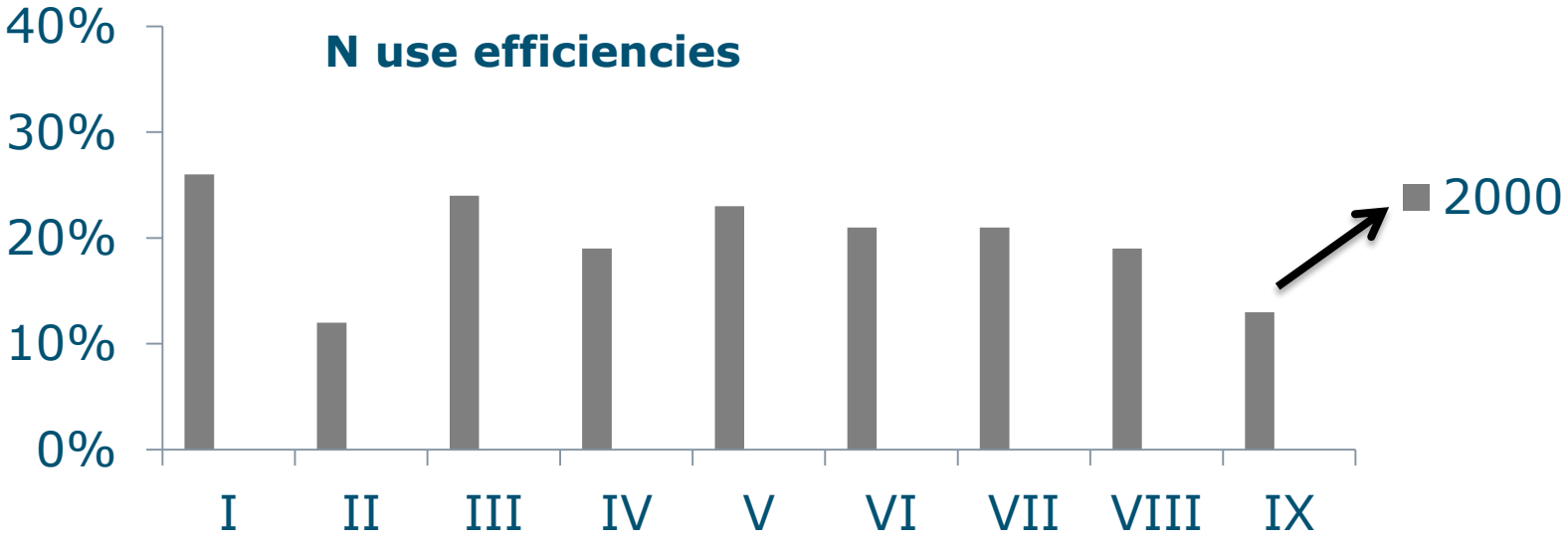
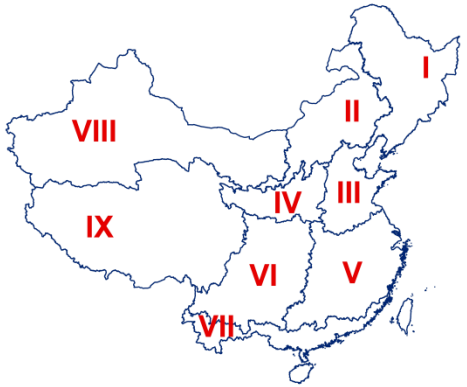
Nitrogen (N) use efficiencies and losses to surface water: 2000-2030





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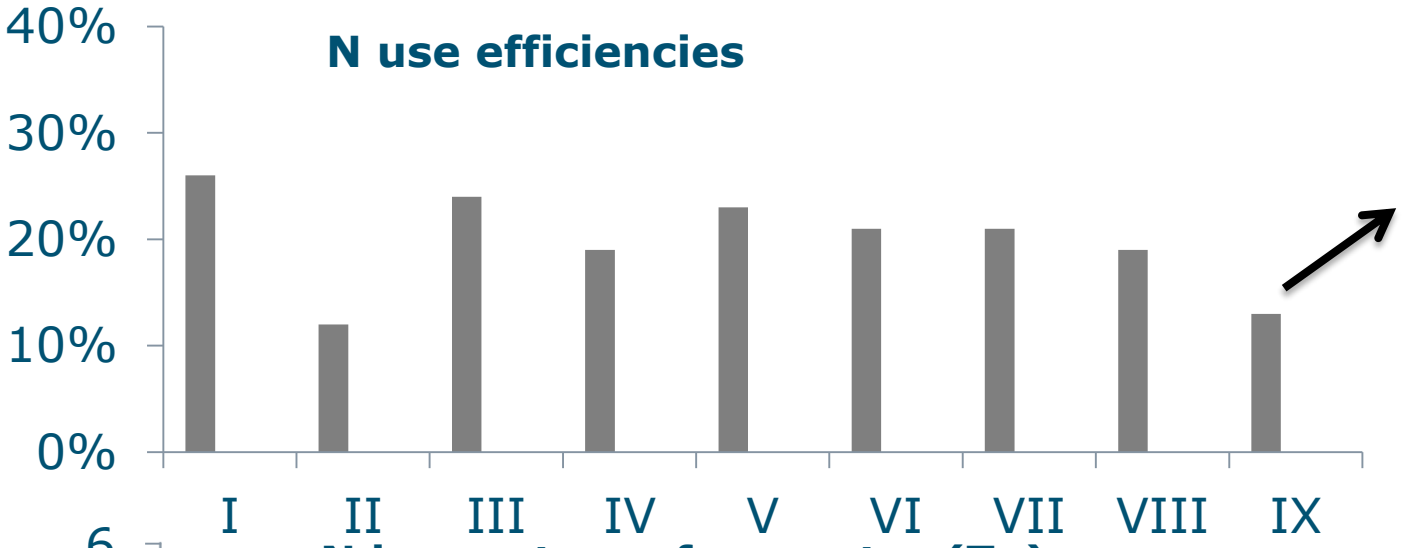

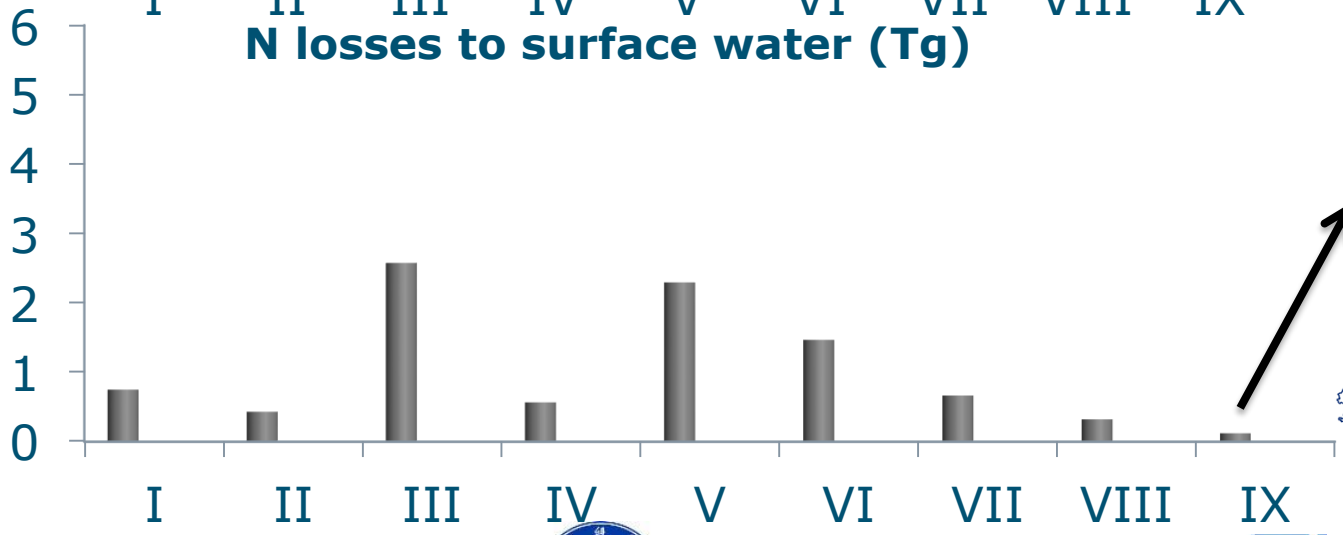

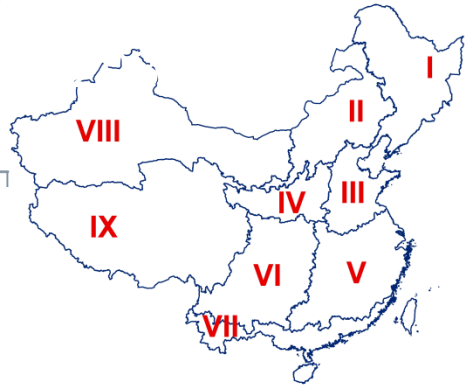

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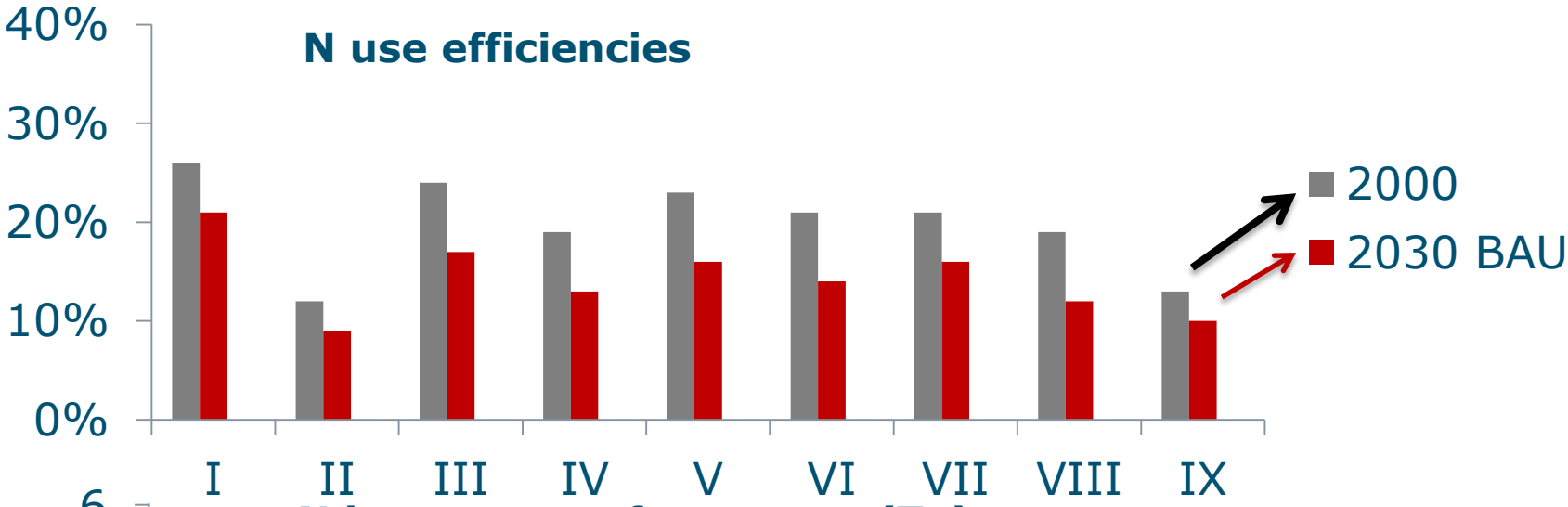

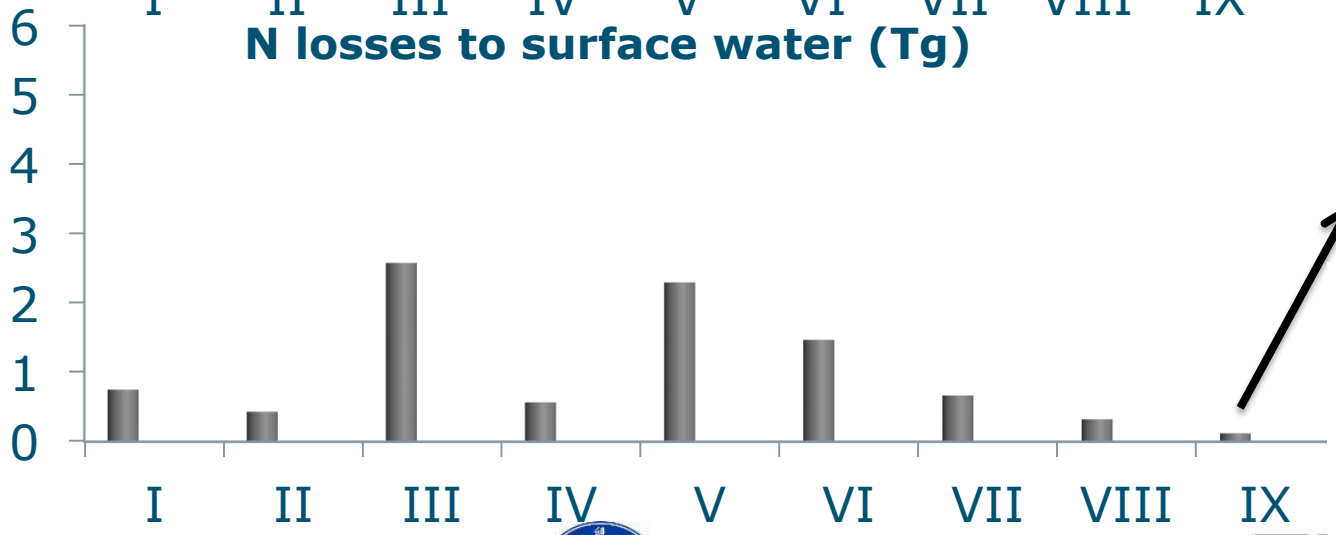

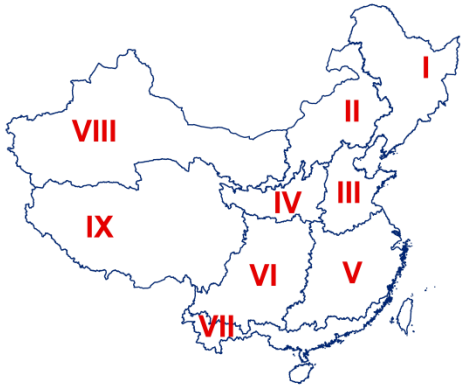

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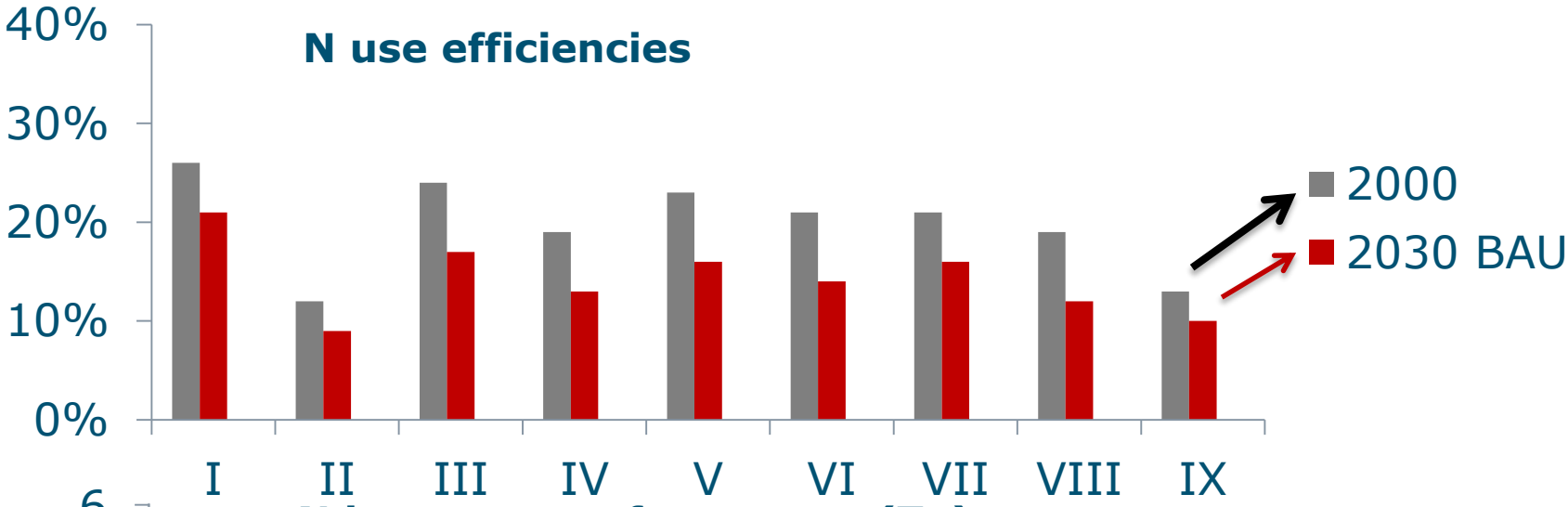

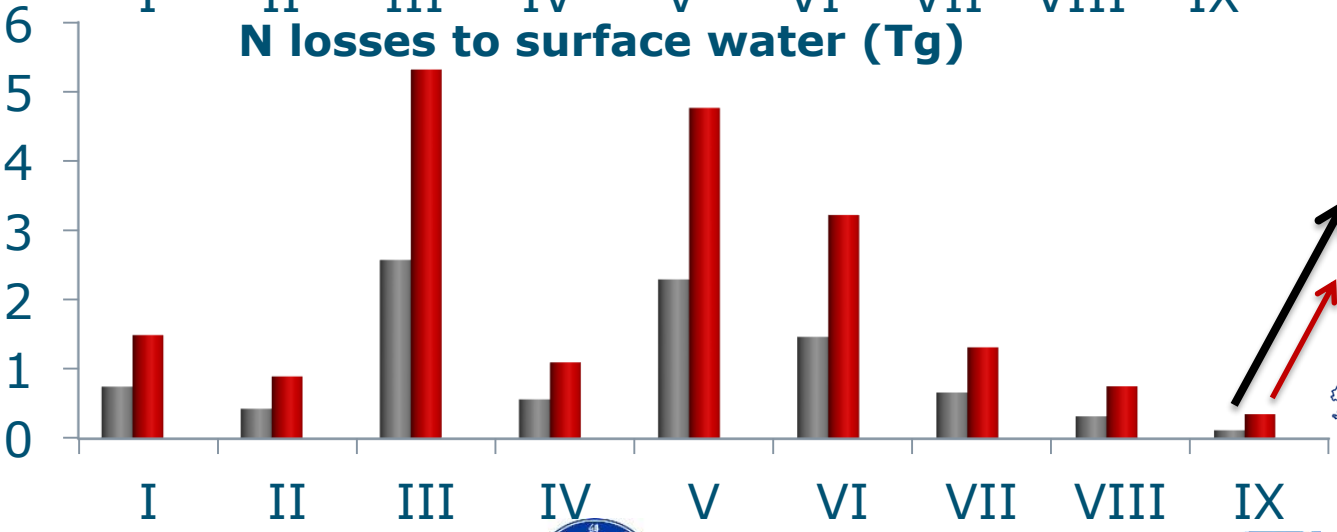

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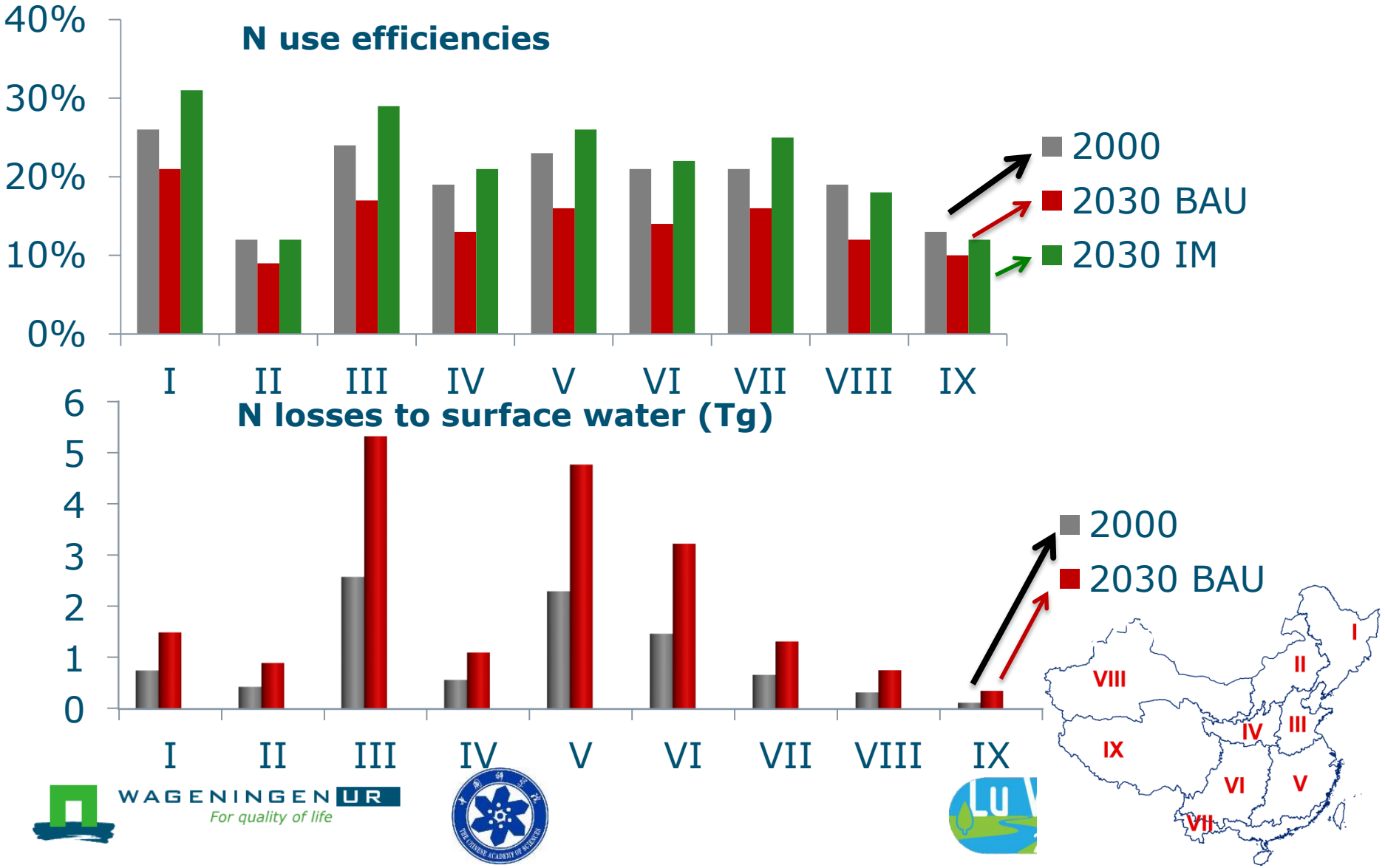

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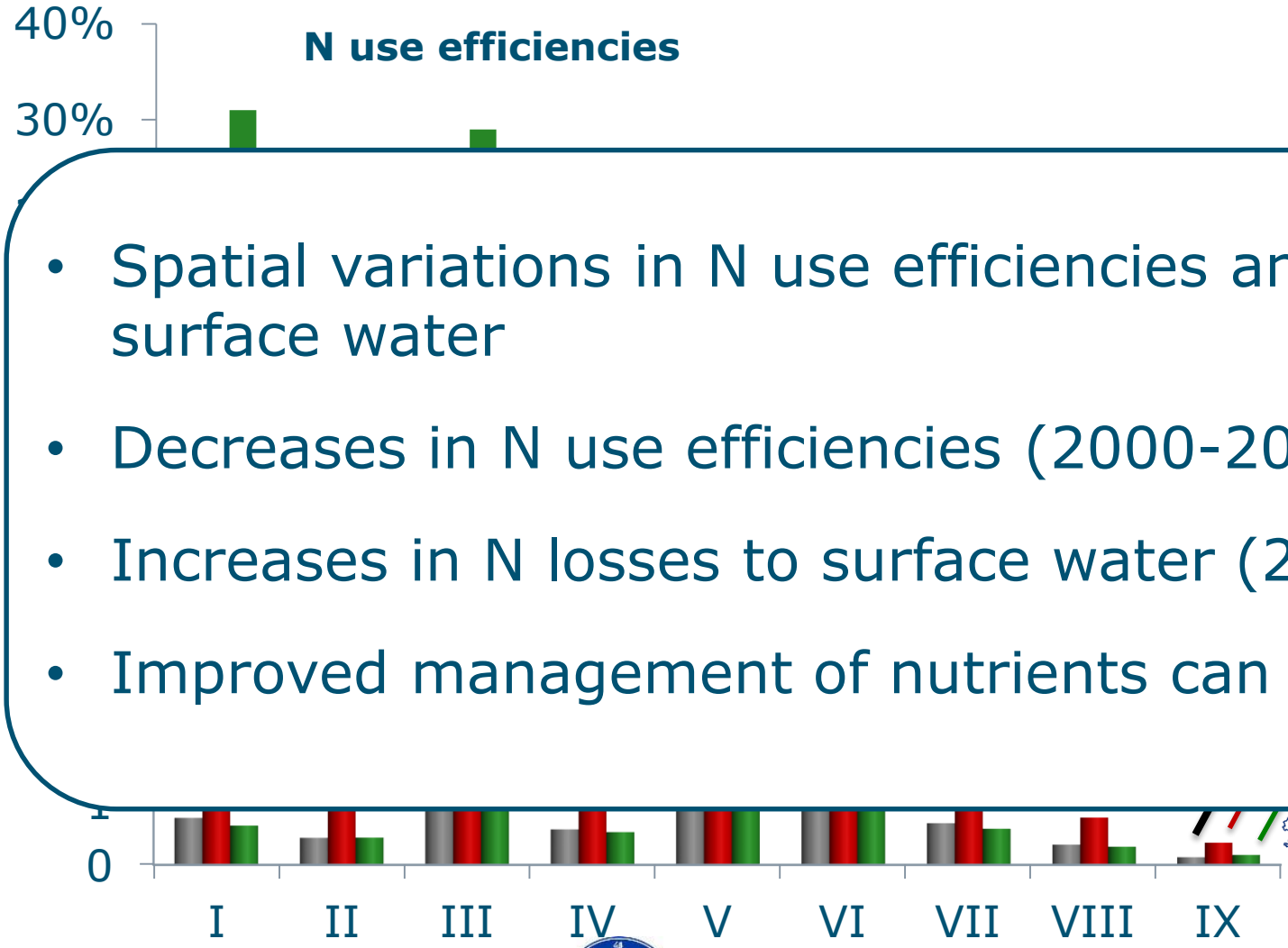

- Spatial variations in N use efficiencies and losses to surface water
- Decreases in N use efficiencies (2000-2030)
- Increases in N losses to surface water (2000-2030)
- Improved management of nutrients can help

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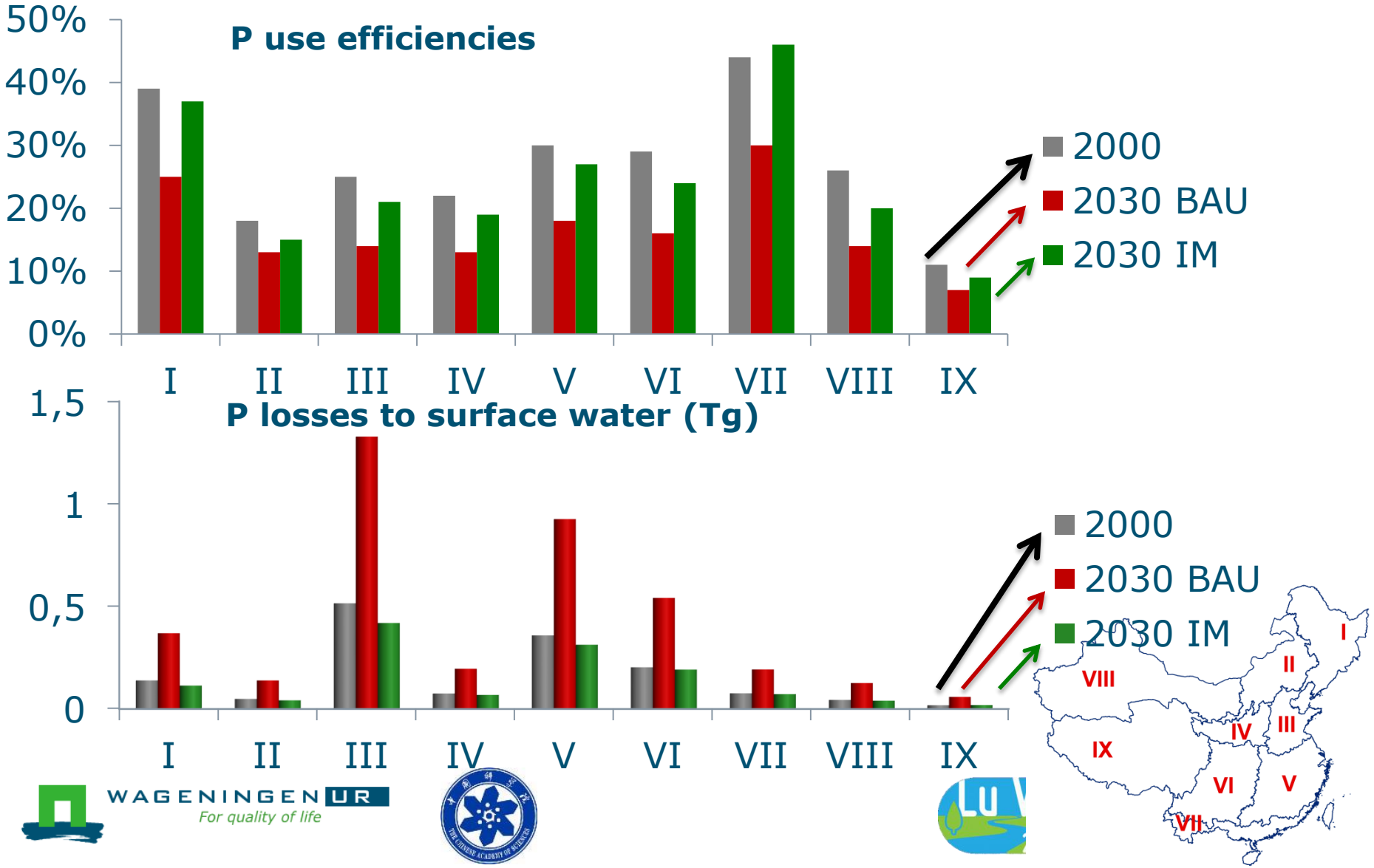
Phosphorus (P) use efficiencies and losses to surface water: 2000-2030



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Conclusions

- Decreasing N and P use efficiencies in agriculture
- Increasing N and P losses to surface water
- Large spatial variations
- Better nutrient management in agriculture helps

Thank you

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